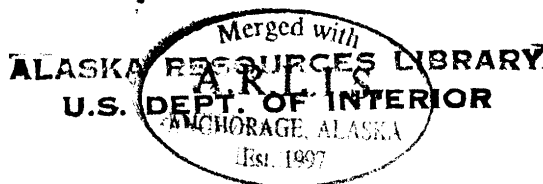


Volume 8



1966-1967

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STATE OF ALASKA

Walter J. Hickel, Governor

ANNUAL REPORT OF PROGRESS, 1966 - 1967

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-8

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME  
Urban C. Nelson, Commissioner

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## INTRODUCTION

This report of progress consists of findings and work accomplished under the State of Alaska Federal Aid In Fish Restoration Project F-5-R-8, "Sport Fish Investigations of Alaska."

The project during this report period is composed of 20 separate studies. Some are specific to certain areas, species or fisheries, while others deal with a common need for information. Each job has been developed to meet the needs of various aspects of the State's recreational fishery resource. Seven jobs are designed to pursue the cataloging and inventory of the numerous State waters. These are divided into logical utilization areas and are jobs of a continuing nature. It will be many years before an index of the potential recreational fishing waters is completed. Six jobs are directed toward specific sport fish studies. These include special efforts toward the anadromous Dolly Varden of Southeastern Alaska, silver salmon in Resurrection Bay, king salmon stocks on the lower Kenai Peninsula, king and other salmon stocks in Upper Cook Inlet, and Arctic grayling and sheefish in Interior Alaska. Special reports have been prepared on specific phases of the Dolly Varden life history and appear in the Department's special "Research Report" series.

The Statewide access evaluation remains one of the most important jobs conducted under this Federal Aid Program. It provides the Department with a tool to recommend withdrawal of suitable access sites on potential recreational fisheries throughout the State.

The remaining jobs include creel census efforts on specific fisheries in high use areas of the State, an egg-take program directed toward locating suitable indigenous stocks, perfecting advanced techniques in taking, handling and rearing species that are not normally associated with standard fish cultural practices, and continuation of the evaluation of the Fire Lake System.

The material contained in this report is often fragmentary in nature. The findings, evaluations and interpretations contained herein are subject to re-evaluation as the work progresses and additional data are collected.

## RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No: F-5-R-8 Title: Inventory and Cataloging of the Sport Fish and its Waters on the Kenai, Cook Inlet-Prince William Sound Areas.

Job No: 7-A

Period Covered: July 1, 1966 to June 30, 1967.

## ABSTRACT

A creel census on the Russian River during the flies-only season showed an estimated 21,820 red salmon, Oncorhynchus nerka, were caught during 17,887 man-days of effort. Foul-hooked fish comprised 41 percent of the harvest. The seasonal rate of success was 0.21 fish per hour.

A partial creel census was conducted from June 24 through September 5 to determine the sport fish potential of Kachemak Bay. A total of 714 anglers with a catch of 893 fish was interviewed during the study. Dolly Varden, Salvelinus malma, and halibut, Hippoglossus stenolepis, accounted for 71 percent of the recorded harvest.

A total of 833 Arctic grayling, Thymallus arcticus, from Crescent Lake was introduced into four Kenai Peninsula waters in an attempt to establish self-sustaining populations. Transplanted fish were predominantly age II and had a mean fork length of 267 mm.

Cataloging and inventory activities were performed on five roadside lakes. Four of these waters contained game fish with rainbow trout, Salmo gairdneri, the most common species.

## RECOMMENDATIONS

Retain present objectives of the study with emphasis directed toward the following:

1. Continue the Russian River creel census to determine the effect of a flies-only regulation on red salmon.
2. Continue a creel census on the saltwater sport fishery in Kachemak Bay.
3. Evaluate past Arctic grayling introductions and investigate additional waters for the establishment of this species.
4. Evaluate roadside lakes which have no game fish populations for possible rehabilitation and stocking.
5. Initiate a rainbow trout and Arctic char, Salvelinus alpinus, age and growth study.

## OBJECTIVES

1. To assess the environmental characteristics of the existing and potential fishery waters of the job area and, where practicable, obtain estimates of existing or potential angler use and sport fish harvest.
2. To evaluate application of fishery restoration measures and availability of sport fish egg sources.
3. To assist as required in the investigation of public access status to the area's fishing waters.

4. To evaluate multiple water use, development projects (public and private) and their effects on the area's streams and lakes for the proper protection of the sport fish resources.
5. To provide recommendations for the management of sport fish resources in these waters and direct the course of future studies.

#### TECHNIQUES USED

The Russian River creel census was a modification of the method described by Neuhold and Lu (1957). Sampling procedures were similar to those outlined by Engel (1964) except that the number of fishermen counts was increased to include four of the five weekdays.

The Kachemak Bay creel census was conducted by one man billeted at the Homer boat harbor. Insufficient preliminary data concerning the fishery and the use of the census taker on other projects precluded construction of a sampling design to estimate total catch and effort. The census was normally active six days a week including all weekend days. Each census day was sampled in a manner producing a maximum number of angler interviews. Catch statistics obtained from each completed angler included number of fish caught by species, number of hours fished, location of the catch and angling method.

Transplanted grayling were collected with a 50-foot beach seine at the outlet of Crescent Lake. Fish were placed in holding pens in the lake prior to being transported by aircraft in 10- and 22-gallon plastic containers. Bottled oxygen was utilized during each transplant and water temperatures were maintained between 52 and 54° F. Shipments were made at densities as high as two pounds of fish per gallon of water. The maximum time in transit was 1 hour and 10 minutes. The Upper Granite Creek transplant was flown to Upper Summit Lake and then was taken to Upper Granite Creek by truck.

Standard lake survey methods were used to collect physical and chemical data. Mono-filament and multifilament gill nets (125 x 6-foot) having five mesh sizes ranging from 3/4- to 2-inch bar measure were employed to determine the fish species present, relative abundance, and to obtain age and growth information. Fork lengths were recorded to the nearest millimeter.

#### FINDINGS

##### Russian River Creel Census

The Russian River has been the site of a rapidly growing sport fishery for red salmon since 1962. Because snagging has been a common angling practice both biological and ethical aspects of the fishery have received considerable attention in recent years. In December of 1965, the Board of Fish and Game, in an attempt to establish an acceptable method of harvest, adopted a flies-only regulation for the Russian River. The new regulation, specifying an unweighted single hook fly with gap between point and shank 1/2-inch or smaller, was in effect during nearly all of the red salmon run. Removal of a closed area at the confluence of the Russian-Kenai Rivers was the only other regulatory change.

Past management methods for the Russian River have been discussed by Lawler (1963) and Engel (1965). Regulation changes since 1960 are shown in Table 1.

To evaluate the effects of the flies-only regulation, the creel census initiated in 1962 was continued during this report segment. The census extended from June 15 through August 15 and sampled nearly the entire fishing effort on red salmon. Seventy-three fishermen counts during this period enumerated 6,252 anglers. The 35 weekday and 38 weekend day counts averaged 56.2 and 112.7 fishermen, respectively. Projected fishermen counts estimate 17,887 man-days of effort or a total of 91,197 fishing hours. Anglers fished an average of 4.8 hours on weekdays and 5.5 hours on weekend days.

Based on interviews with 7,077 fishermen who had caught 7,719 fish, the harvest was estimated to be 21,820 red salmon. This catch, despite more restrictive regulations, was 104 percent greater than the previous high recorded for the stream. Table 2 summarizes fishing effort, harvest, and the rate of success since 1962.

Snagging with flies and a large red salmon run to the system were two factors that complicate an evaluation of the current regulations. Improved fishing ethics resulting from the flies-only restriction are not believed to have significantly increased the fishing effort. Although anglers changed their lures, snagging still accounted for

TABLE 1. Seasonal Regulations Governing Sport Fishing on the Russian River by Year, 1960-1966.

<u>Year</u>	<u>Method and Means</u>	<u>Dates of Fishery</u>	<u>Closed Areas*</u>
1960	Standard restrictions 1/4 in. multiple hook without lure and 1/2 in. with lure	No restrictions-usual spring opening from May 28 to Dec. 31	Within 600 yds. of the Kenai-Russian R. confluence closed to all fishing
1961	Standard restrictions-same as 1960	No restrictions-same as 1960	From the Kenai-Russian R. confluence to 600 yds. upstream on Russian R. closed to all fishing
1962	Standard restrictions-same as 1960	No restrictions May 26 to Dec. 31	Same as 1961 but closed only from March 31 to Sept. 30
1963	Standard restrictions-same as 1960	No restrictions-same as 1962	Same as 1962
1964	Standard restrictions-same as 1960	No restrictions-open third Sat. in May to Dec. 31	Same as 1962
1965	Two single 1/2 in. hooks which are not ridgedly attached to lures of standard manufacture	Single hooks only from June 15 to August 15	Closed area-same as 1962; single hook area from 600 yds. below Russian R. falls to 500 yds. on Kenai R. below Kenai-Russian R. confluence
1966	One unweighted single 1/2 in. hook fly. Weights must be at least 12 in. ahead of the fly	Flies only from June 15 to August 31	Closed area (1960-65) at Kenai-Russian R. confluence eliminated; Fly area from 600 yds. below Russian R. falls to 500 yds. on Kenai-Russian R. confluence

\* Closed to salmon fishing upstream from a point 600 yards below Russian River falls since 1960.

TABLE 2. Red Salmon Sport Harvest, Effort, Catch Per Hour and Tower Count at the Russian River, 1962-66.

<u>Year</u>	<u>Harvest</u>	<u>Effort (man-days)</u>	<u>Catch per hour</u>	<u>Period of Census</u>	<u>Tower Count</u>	<u>% Taken by Sport Fishery</u>
1962	4,700	6,595	0.22	6/15 to 8/21	48,214	8.9
1963	5,062	7,882	0.19	6/ 8 to 8/15	56,960	8.2
1964	6,855	4,942*	0.31	6/20 to 8/20	52,052	11.6
1965	10,700	8,318	0.25	6/16 to 8/15	37,152	22.4
1966	21,820	17,887	0.21	6/15 to 8/15	43,880	33.2

\* Damage to the Seward Highway by the March 27 earthquake resulted in reduced effort.

41 percent of the catch. The 1965 harvest, under a single hook rule, consisted of approximately 61 percent snagged fish. Foul-hooked fish comprised virtually the entire harvest prior to 1965.

Under trebel hook regulations (1962-1964) the average rate of success was 0.24 salmon per hour; during the single hook season (1965) the success improved to 0.25 fish per hour. The more stringent flies-only regulation resulted in a slightly lower catch rate of 0.21 fish per hour.

A counting tower at the outlet of Lower Russian Lake provides an assessment of the escapement after it has passed both the Cook Inlet commercial and Russian River sport fisheries. Since 1960, escapements past the tower have averaged 42,679 with a maximum estimate of 56,960 red salmon in 1963. On the basis of 21,820 sport-caught red salmon and a tower count of 43,880, the run to the stream in 1966 was the largest on record.

The seasonal pattern of the red salmon run was bimodal in 1966, a condition historically noted at the Russian River. Early-run fish, referred to locally as "bluebacks," began entering the stream in early June and had passed through the fishery by early July. The second run arrived in late July and was nearly over by August 15. Cumulative daily tower counts are depicted in Figure 1.

The rapid growth of the sport fishery closely parallels increasingly stringent seasonal restrictions on the commercial fishery. Prior to 1961, the Cook Inlet commercial salmon fishery opened the last week in May in time to harvest the early Russian River run. During 1961, 1962, and 1963, later opening dates (June 8, 7, 6, respectively) were imposed on the fishery as a conservation measure to protect king salmon (*Oncorhynchus tshawytscha*). By 1964 it was apparent that the king salmon stocks needed further protection and the season opened June 25. The late opening which eliminated a commercial harvest of early Russian River fish has been continued since that time.

Tower counts and census data indicate that the number of early red salmon available to the Russian River sport fishermen has more than doubled since the early 1960's. The importance of this segment of the run was exemplified in 1966 when 75 percent of the seasonal harvest occurred during the early migration. The harvest rate for "bluebacks," nearly 50 percent of the escapement, also reflects the intensity of the early fishery.

The sport harvest, based on a tower estimate of 43,880 red salmon, constituted 33.2 percent of the run to the Russian River. Table 2 shows past tower estimates and percentages of the runs taken by the sport fishery. Although useful as a relative index, these percentages probably do not represent true harvest rates for the following reasons:

1. A significant part of the Russian River run is known to spawn below the counting tower. Foot surveys in 1966 revealed a minimum of 10,000 red salmon spawning in this portion of the stream.
2. Annually, 30 to 40 percent of the red salmon catch is taken at the confluence of the Kenai-Russian Rivers. Salmon migrating up the glacial Kenai River tend to school in this area prior to entering the Russian River or continuing on to spawning grounds located in the upper Kenai River watershed. Undoubtedly, some of the salmon included in the Russian River harvest are upper Kenai River stocks.

#### Kachemak Bay Creel Census

Kachemak Bay is a large, clear body of water located on the east side of Cook Inlet near the southern tip of the Kenai Peninsula. The northern shore of the bay is generally uniform with a gradually sloping beachline while the southern shore is irregular, often steep, with numerous indentations. The town of Homer is situated on the north shore of Kachemak Bay near the base of the Homer Spit. A small-boat basin, located near the outer end of the 4 1/2-mile-long spit, provides all-weather moorage facilities.

Recreational use of the bay has remained relatively low because of poor road connections with Anchorage and neighboring communities. It is expected, however, that completion of the new Sterling Highway (scheduled for 1967) will stimulate considerable recreational interest in the area. A newly constructed boat basin should also be instrumental in attracting greater numbers of pleasure craft to the region.

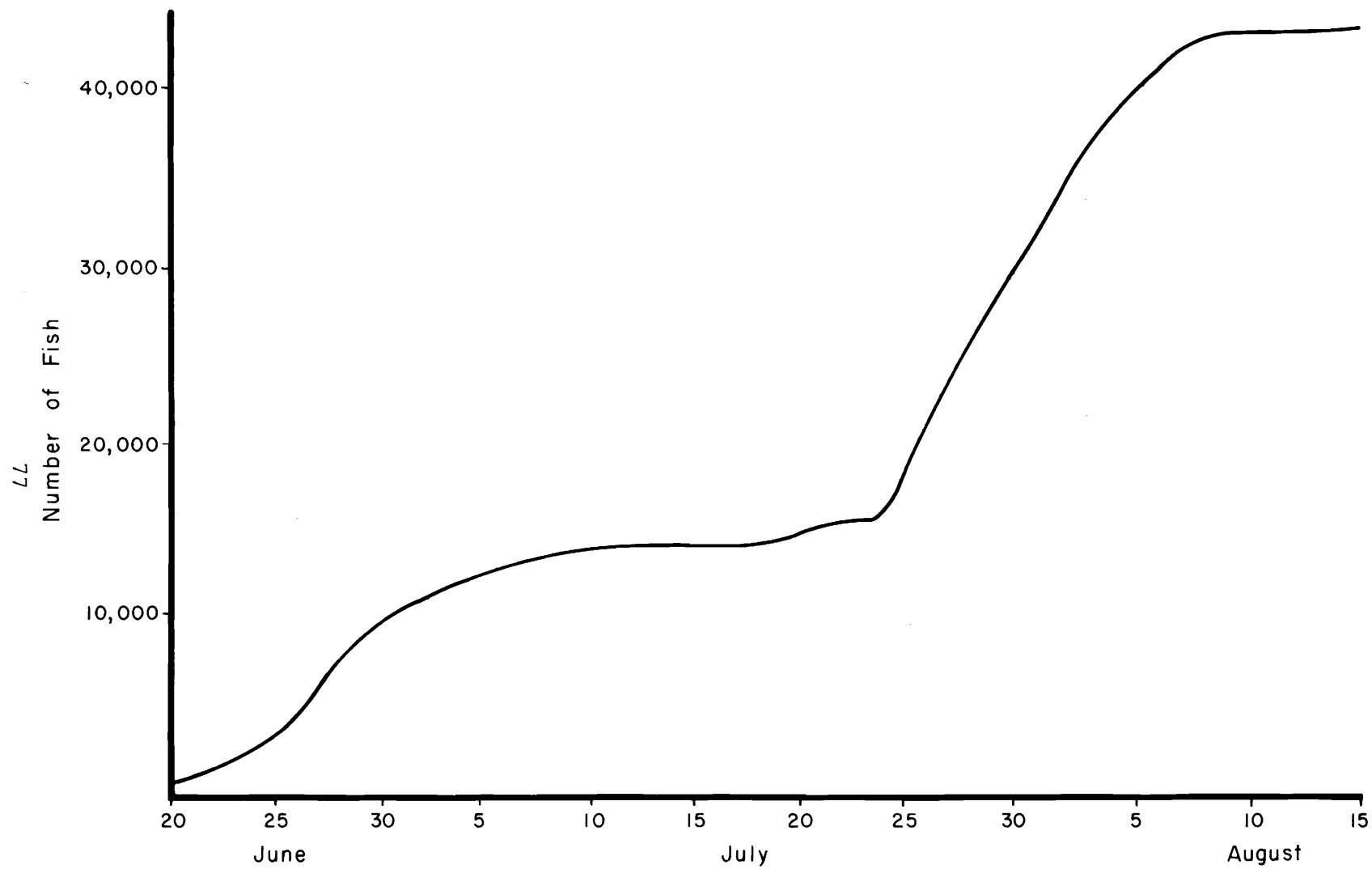


Figure 1. Cumulative Daily Counts of Red Salmon Passing the Russian River Tower, 1966.

To determine the sport fish potential of the bay a partial creel census was conducted from June 24 through September 5. A total of 714 fishermen having 893 fish was interviewed. Anglers fishing from piers or shore areas along the Homer Spit accounted for the bulk (83.7%) of the contacts while boat fishermen comprised the remaining interviews.

Spit fishermen were generally less concerned with angling success and could be classified as "casual" anglers with respect to the boat fishermen. Anglers fishing from the Spit fished an average of 2.2 hours per trip whereas boat fishermen averaged 5.0 hours. The mean rate of success for shore and boat fishermen was 0.48 and 0.45 fish per hour, respectively.

Fishing pressure on weekends and holidays (48%) was nearly equal to that on weekdays. Fifty-one percent of the recorded effort occurred during the month of July. Reduced effort after July appeared to be influenced by inclement weather rather than a drop in the success rate.

Dolly Varden and halibut comprised 71 percent of the catch and were available to the sport fishery throughout the census period. Pink salmon, Oncorhynchus gorbuscha, and silver salmon, O. kisutch, entered the fishery in early and mid-July, respectively. Both species were present when the census terminated. Other species entering the catch included flounders, Pleuronectidae, cod, Gadidae, and sablefish, Anoplopoma fimbria. Table 3 shows the species composition of the harvest.

TABLE 3. Species Composition of the Kachemak Bay Sport Harvest, 1966.

<u>Species</u>	<u>Number of Fish Recorded</u>	<u>Percent of Catch</u>
Dolly Varden	391	43.8
Halibut	242	27.1
Pink Salmon	102	11.4
Flounder	70	7.8
Cod	45	5.1
Silver Salmon	43	4.8

Fork lengths for 307 Dolly Varden ranged from 200 to 540 mm with a mean of 352 mm. Ninety-five halibut averaged 586.3 mm in length with the largest weighing 87 lbs.

Eighty percent of the halibut were caught with herring. Dolly Varden were more responsive to different angling methods with salmon eggs, herring, and spoons or spinners proving equally popular and effective for this species.

The census also revealed a growing recreational interest in a variety of shellfish. Hardshelled clams are present in varying numbers along many gravel beaches of southern Kachemak Bay. Butter clams, Saxidomus giganteus, and native little neck clams, Protothaca staminea, were the most common bivalves encountered and were particularly abundant at Halibut Cove, Pederson Bay and along McDonald Spit.

Dungeness crabs, Cancer magister, were another popular invertebrate. Ring-net fishing from the Homer Spit was productive for this crustacean throughout the study period. Pier fishermen also frequently used conventional hook and line to capture crabs.

The census revealed 111 fishermen that were exclusively seeking crabs and 53 anglers that were crabbing and fishing during the same outing. The recorded harvest was 985 dungeness and 6 king crabs, Paralithodes camtschatica. Ring-net fishermen accounted for 77 percent of the catch.



### Grayling Transplants

Arctic grayling, which are not indigenous to the Kenai Peninsula, were introduced into Crescent Lake in 1952. A popular and productive fishery has developed from the original plant of 240 grayling. Since 1962, attempts have been made annually to transplant Crescent Lake stock to other Peninsula waters. During this report segment, with assistance from the U.S. Forest Service and the U.S. Fish and Wildlife Service, four experimental grayling transplants were conducted. All waters chosen for introductions are believed to have suitable spawning areas for self-sustaining populations.

At the outlet of Crescent Lake, 833 grayling were seined from August 2 through August 4. Holding and transfer losses amounted to 26 fish. Table 4 shows the number of fish and the lakes where the introductions were made.

Fork lengths from 48 transplanted fish ranged from 167 to 368 mm with a mean of 267 mm. Scale readings from 46 of these fish suggested that the transplant was composed of 2 percent age I, 72 percent age II, 24 percent age III, and 2 percent age IV.

TABLE 4. Waters Stocked With Grayling During 1966.

<u>Name</u>	<u>Surface Acres</u>	<u>Number of Fish</u>
Twin Lakes *	260	97
Juneau Lake **	150	313
Upper Granite Creek	---	347
Primrose Creek	---	50
* Stocked with 176 grayling in 1965		
** Stocked with 100 grayling in 1964		

Upper Paradise Lake was surveyed during early July to evaluate the success of grayling introductions in 1962 and 1963. According to Lawler (1962, 1963) the combined transplants totaled approximately 350 fish and were predominantly age I and II. To determine the status of these plants two gill nets were fished 16.5 hours each. Forty-four grayling were collected which ranged from 174 to 334 mm with a mean of 264.6 mm. The catch, based on scale readings from 43 specimens, consisted of 42 percent age II+ and 58 percent age III+ fish. Grayling believed to be age I+ were also present at the outlet of the lake.

In view of the number of fish observed during the survey and the presence of at least three naturally produced age classes, the transplant appears to be a success.

### Lake Surveys

Preliminary survey work was initiated on five lakes during this report period. With the exception of Blizzard Lake each lake is immediately adjacent to a road. Table 5 shows the location, size and maximum observed depth of these waters. Population sampling revealed game fish in four lakes with rainbow trout the most common species (Table 6). Silver salmon, Arctic char and longnose suckers, Catostomus catostomus, were also present in several lakes. Threespine sticklebacks, Gasterosteus aculeatus, were abundant in each of the waters.

TABLE 5. Location, Surface Acreage and Maximum Depth of Lakes Surveyed on the Kenai Peninsula During 1966.

<u>Name of Lake</u>	<u>Surface Acres*</u>	<u>Maximum Observed Depth (ft.)</u>	<u>Location</u>
Price	62	33	T8N., R11W., Sec. 24
Stormy	390	50	T8N., R10W., Sec. 15-16 20-21
Blizzard	60	34	T4N., R7W., Sec. 1
Glacier	4	20	T6N., R12W., Sec. 24
Tube	20	24	T2N., R12W., Sec. 1-12

\* Acreages were determined by map grids from U.S.G.S. maps (1:63,360).

Complete records of all cataloging and inventory activities during this report segment are on file at the Seward and Soldotna offices of the Alaska Department of Fish and Game.

TABLE 6. Test Net Results for Lakes Surveyed on the Kenai Peninsula During 1966.

<u>Name of Lake</u>	<u>Species *</u>	<u>No. of Fish</u>	<u>Fork Length (mm)</u>		<u>Catch ** Per Hr.</u>
			<u>Range</u>	<u>Mean</u>	
Price	RB	20	138-328	177	0.48
	SS	3	135-148	140	0.07
	SK	1	-----	392	0.02
Stormy	RB	34	155-397	243	0.48
	Char	23	276-510	329	0.32
	SS	11	115-176	150	0.15
	SK	23	145-448	290	0.32
Blizzard	SS	7	167-185	175	0.15
	RB	4	320-430	386	0.09
Glacier	SS	11	153-180	167	0.30
Tube	No Fish Taken				

\* Key: RB = Rainbow Trout, Char = Arctic Char, SS = Silver Salmon, SK = Longnose Sucker  
 \*\* Catch/net hour - 125 X 6-foot variable mesh.

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Preparations for an Arctic Grayling Egg-Take are Accomplished under less than Desirable Conditions.